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IS 8484 (1998): Metal powders welding electrodes [MTD 11: Welding General]



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भारतीय मानक

वेल्डिंग इलेक्ट्रोड के लिए धातु पाउडर — विशिष्टि
(पहला पुनरीक्षण)

Indian Standard

**METAL POWDERS FOR WELDING
ELECTRODES — SPECIFICATION**

(First Revision)

ICS 77.160 ; 25.160.20

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BUREAU OF INDIAN STANDARDS
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NEW DELHI 110002

FOREWORD

This Indian Standard (First Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Welding General Sectional Committee had been approved by the Metallurgical Engineering Division Council.

This standard was first published in 1977. While reviewing the standard in the light of experience gained during these years, the Committee decided to revise it to bring it in line with the present practices being followed by the Indian Industry.

In this revision, the following modifications have been incorporated:

- a) Four new grades of Iron powders have been incorporated and requirements of existing grades of Iron powders have been modified.
- b) References to additional Indian Standards have been incorporated for determination of apparent density.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

METAL POWDERS FOR WELDING ELECTRODES — SPECIFICATION

(*First Revision*)

1 SCOPE

1.1 This standard covers the requirements for different pure metal powders for manufacture of welding electrodes.

1.2 This standard does not cover the requirements for complex alloy metal powders which are used in small quantities by the welding electrode industry for special applications.

2 REFERENCES

The Indian Standards listed below are necessary adjuncts to this standard:

<i>IS No.</i>	<i>Title</i>
460 (Part 1) : 1986	Test sieves : Part 1 Wires cloth test sieves (<i>third revision</i>)
1387 : 1993	General requirements for the supply of metallurgical materials (<i>second revision</i>)
4848 : 1981	Method for determination of apparent density of free flowing powders for powder metallurgical purposes (<i>first revision</i>)
5432 : 1982	Glossary of terms relating to powder metallurgy (<i>first revision</i>)
5461 : 1984	Methods for sieve analysis of metal powder
5644 : 1985	Method for determination of hydrogen loss of metallic powders (<i>second revision</i>)
6492 : 1972	Methods for sampling of powders for powder metallurgical purposes
10441 : 1991	Metallic powders — Determination of apparent density — Oscillating funnel method (<i>first revision</i>)
11627 : 1987	Methods for determination of apparent density of metallic powders by scott volumeter

3 TERMINOLOGY

For the purpose of this standard, the definitions given in IS 5432 shall apply.

4 SUPPLY OF MATERIAL

General requirements relating to the supply of metal powders shall be as laid down in IS 1387.

5 CHEMICAL COMPOSITION

5.1 The chemical compositions of the various metal powders shall be as given in Table 1.

5.1.1 Methods of chemical analysis of metal powders shall be as agreed to between the purchaser and the manufacturer.

6 SIEVE ANALYSIS

6.1 The sieve analysis of the material shall be carried out in accordance with IS 5461 and shall conform to the requirements given in Table 2.

6.1.1 The test sieves used shall be according to IS 460 (Part 1).

7 HYDROGEN LOSS

7.1 The hydrogen loss requirements shall apply only to iron and copper powders and shall be determined in accordance with the method given in IS 5644. The hydrogen loss on calcination shall be 0.5 percent maximum for grades 1 to 4 of iron powders and 1.1 percent maximum for grades 5 and 6. For copper powder the hydrogen loss on calcination shall be 0.3 percent maximum.

7.2 Iron and copper powders shall be suitably passivated to prevent oxidation during storage.

8 APPARENT DENSITY

Requirements of apparent density shall only apply to iron and copper powders. Iron powders shall be of 3 types having apparent densities 2.4, 2.8 and 3.6 g/cm³ (minimum) and copper powders shall have density of 3.65 g/cm³ (minimum) when determined in accordance with IS 4848 or IS 10441 or IS 11627.

9 SAMPLING

The sampling of powders shall be done in accordance with IS 6492.

10 PACKING

The material shall be packed in suitable containers in quantities mutually agreed to between the purchaser and the manufacturer.

11 MARKING

11.1 Each container of metal powder shall be legibly and indelibly marked with the name or trade- mark of the manufacturer, weight and grade of the material.

11.2 BIS Certification Marking

The material may also be marked with the Standard Mark.

11.2.1 The use of the Standard Mark is governed by the provisions of *Bureau of Indian Standards Act, 1986* and the Rules and Regulations made thereunder. The details of conditions under which the licence for the use of Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

Table 1 Chemical Composition of Metal Powders
(Clause 5.1)

Name of Metal Powder	Constituent Percent (Except where indicated in ppm)																				
	Fe	Mn	Si	C	S	P	SiO ₂	Cr	N	H	Ni	Cu	Co	Mo	W	Sn	Mg	Ca	Al	Pb	Sb
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)
Iron Powder																					
Grade 1	98.0 <i>Min</i>	0.3 <i>Max</i>	—	0.04 <i>Max</i>	0.012 <i>Max</i>	0.012 <i>Max</i>	0.35 <i>Max</i>	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Grade 2	98.0 <i>Min</i>	0.3 <i>Max</i>	—	0.05 <i>Max</i>	0.015 <i>Max</i>	0.015 <i>Max</i>	0.35 <i>Max</i>	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Grade 3	98.0 <i>Min</i>	0.3 <i>Max</i>	—	0.04 <i>Max</i>	0.012 <i>Max</i>	0.012 <i>Max</i>	0.35 <i>Max</i>	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Grade 4	98.0 <i>Min</i>	0.3 <i>Max</i>	—	0.02 <i>Max</i>	0.012 <i>Max</i>	0.012 <i>Max</i>	0.35 <i>Max</i>	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Grade 5	98.0 <i>Min</i>	0.3 <i>Max</i>	—	0.03 <i>Max</i>	0.012 <i>Max</i>	0.012 <i>Max</i>	0.35 <i>Max</i>	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Grade 6	98.0 <i>Min</i>	0.3 <i>Max</i>	—	0.12 <i>Max</i>	0.012 <i>Max</i>	0.012 <i>Max</i>	0.35 <i>Max</i>	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Manganese Metal Powder	0.03 <i>Max</i>	99.5 <i>Min</i>	0.01 <i>Max</i>	0.01 <i>Max</i>	0.02 <i>Max</i>	0.017 <i>Max</i>	—	—	—	—	—	—	—	—	—	—	—	Ca+Pb 10ppm	0.05 <i>Max</i>	—	—
Chromium Powder	0.2 <i>Max</i>	—	0.1 <i>Max</i>	0.02 <i>Max</i>	0.02 <i>Max</i>	0.02 <i>Max</i>	—	98.0 <i>Min</i>	0.02 <i>Max</i>	—	—	—	—	—	—	—	—	—	0.1 <i>Max</i>	—	—
Nickel Powder (Oxygen content 0.02 Max):																					
Grade 1	—	—	—	0.05 <i>Max</i>	0.01 <i>Max</i>	0.01 <i>Max</i>	—	—	—	0.025 <i>Max</i>	99.5 <i>Min</i>	—	—	—	—	—	—	—	—	—	—
Grade 2	0.01 <i>Max</i>	—	—	0.002 <i>Max</i>	0.02 <i>Max</i>	—	—	—	—	0.025 <i>Max</i>	99.9 <i>Min</i>	0.002 <i>Max</i>	0.07 <i>Min</i>	—	—	—	—	—	—	—	—
Copper Powder	—	—	—	0.04 <i>Max</i>	—	—	—	—	—	—	—	99.0 <i>Min</i>	—	—	—	—	—	—	—	—	—
Aluminium Powder	0.4 <i>Max</i>	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	99.3 <i>Min</i>	—	—
Molybdenum Powder	150 ppm	25 ppm	—	0.02 <i>Max</i>	0.02 <i>Max</i>	0.02 <i>Max</i>	45 ppm	70 ppm	—	—	50 ppm	25 ppm	—	99.8 <i>Min</i>	150 ppm	30 ppm	30 ppm	50 ppm	45 ppm	—	—
Cobalt Powder	—	—	—	0.05 <i>Max</i>	0.03 <i>Max</i>	—	—	—	—	—	—	—	99.9 <i>Min</i>	—	—	—	—	—	—	—	—
Tin Powder	—	—	—	—	—	—	—	—	—	—	—	0.01 <i>Max</i>	—	—	—	99.5 <i>Min</i>	—	—	—	0.20 <i>Max</i>	0.007 <i>Max</i>
Tungsten Powder	50 ppm	5 ppm	15 ppm	—	—	—	—	10 ppm	—	—	5 ppm	5 ppm	—	286 ppm	99.9 <i>Min</i>	5 ppm	5 ppm	10 ppm	5 ppm	—	—
Magnesium Powder	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	98.0 <i>Min</i>	—	—	—	—

Table 2 Sieve Analysis Requirements for Metal Powders
(Clause 6.1)

Name of Metal Powder	Percent by Mass of Material Passing Through IS Sieve [see IS 460 (Part 1)]							
	600 Microns	355 Microns	212 Microns	150 Microns	75 Microns	63 Microns	53 Microns	45 Microns
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Iron Powder								
Grade 1	100	35 <i>Min</i>	50-85	20-50	15 <i>Max</i>	—	—	—
Grade 2	100	35 <i>Min</i>	50-85	20-50	15 <i>Max</i>	—	—	—
Grade 3/5/6	100	30 <i>Min</i>	55-75	15 <i>Min</i>	15 <i>Max</i>	—	—	—
Grade 4	—	—	100	91 <i>Min</i>	35 <i>Min</i>	—	—	30 <i>Max</i>
Manganese Metal Powder	—	100	—	—	—	50 <i>Max</i>	—	15 <i>Max</i>
Chromium Powder	—	100	—	—	—	50 <i>Max</i>	—	15 <i>Max</i>
Nickel Powder								
Grade 1A	—	100	—	—	—	50 <i>Max</i>	—	15 <i>Max</i>
Grade 1B	—	—	—	—	100	—	—	95 <i>Max</i>
Grade 2	← Special requirement by mutual agreement →							
Copper Powder	—	100	—	—	—	30-40	—	20 <i>Max</i>
Aluminium Powder	—	—	—	100	95 <i>Min</i>	—	—	—
Molybdenum	—	100	—	—	—	5 <i>Max</i>	—	15 <i>Max</i>
Cobalt Powder	—	100	—	—	—	5 <i>Max</i>	—	15 <i>Max</i>
Tin Powder	—	—	—	—	95 <i>Min</i>	—	90 <i>Min</i>	—
Tungsten Powder	← Size to range between 1 to 4 microns →							
Magnesium Powder	—	100	—	—	—	15 <i>Max</i>	—	—

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